


# EXHIBIT B

# EXHIBIT E

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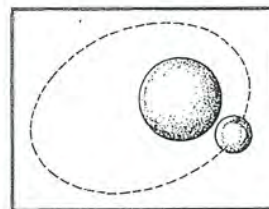
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and that projects into water from a larger land mass. —**pen-  
u-lar** *adj.*  
**pis** (pē'nīs) *n.*, *pl.* **pis-es** or **nes** (-nēz'). The male organ  
of higher vertebrates and usu. of urination in  
amals.  
**pitent** (pē'n-tānt) *adj.* Feeling a sense of sorrow and re-  
sponse for sins or misdeeds; repentant. —*n.* Someone who is  
tent. —**pen-*tence*** *n.* —**pen-*tential*** (-tēn'shəl) *adj.*  
**pen-ti-ti-ary** (pēn'ti-tēn'shā-rē) *n.*, *pl.* **-ries**. A federal or  
prison for those convicted of serious crimes. —*adj.* Result-  
ing in or punishable by imprisonment in a penitentiary.  
**knife** (pēn'nif') *n.* A small pocketknife.  
**light** (pēn'līt') *n.* A flashlight of approx. the size and  
weight of a fountain pen.  
**man** (pēn'mān) *n.* 1. A scribe. 2. Someone with skill in  
manship. 3. An author.  
**man-ship** (pēn'mān-shīp') *n.* The art, style, skill, or  
ner of handwriting.  
*n. abbr.* Pennsylvania.  
**name** also **pen-name** (pēn'nām') *n.* A pseudonym as-  
signed by an author.  
**nant** (pēn'ant) *n.* 1. A long, tapering nautical flag used for  
sailing or identification. 2. A flag that resembles a pennant. 3.  
A flag that symbolizes a championship.  
**ni** (pēn'ē) *n.*, *pl.* **pen-nis** or **pen-ni-a** (-ē-ə). See *markka*  
JERREY TABLE.  
**ni-less** (pēn'līs) *adj.* Completely without money.  
**non** (pēn'ōn) *n.* 1. A banner, esp. a long, narrow flag borne  
by a lance. 2. A bird's wing; pinion.  
**ny-sylva-nia** (pēn'sal-vān'yā, -vā'nē-ə). State of the E.  
Cap. Harrisburg. Pop. 11,866,728. —**Penn-syl-vā-nian** *n.*  
**ny** (pēn'ē) *n.*, *pl.* **pen-nies** or **pence** (pēns). 1. See *pound*  
JERREY TABLE. 2. A U.S. or Canadian coin worth 1 cent.  
**ay pincher** *n.* Informal. A stingy person; miser.  
**n/ny-pinch** *v.*  
**ny-roy-al** (pēn'ē-rol'al) *n.* A mint, *Mentha pulegium*,  
an aromatic hairy leaves and small bluish flowers.  
**ny-weight** (pēn'ē-wāt') *n.* A unit of troy weight equal to  
1/16 of a troy oz., or approx. 1.555 g.  
**ny-wise** (pēn'ē-wīz') *adj.* Wise only in dealing with  
ill matters.  
**ol-ogy** (pēn'ōl'ō-jē) *n.* The theory and practice of crimi-  
nal rehabilitation and prison management. —**pen-ol'o-gist** *n.*  
**sion** (pēn'shān) *n.* An amount of money paid regularly,  
to a person who has retired. —*v.* To pay or grant a pension.  
**pen-sion-er** *n.*  
**sive** (pēn'siv) *adj.* Deeply thoughtful, often in a melan-  
choly or musing way; reflective. —**pen-sive-ly** *adv.*  
**sive-ness** *n.*  
(pēnt) *adj.* Closed or shut up.  
**ta-gon** (pēn'tā-gōn') *n.* A polygon having 5 sides and 5  
interior angles. —**pen-tā-gō-nal** (-tāg'ō-nāl) *adj.*  
**tan-er** (pēn'tām't-er) *n.* A line of verse that consists  
metrical feet.  
**tath-lon** (pēn-tāth'lōn, -lōn') *n.* An athletic contest con-  
sisting of 5 events for each participant.  
**te-cost** (pēn'ti-kōst', -kōst') *n.* The 7th Sunday after  
Easter, celebrated as a Christian festival in commemoration of  
descent of the Holy Ghost on the disciples. —**Pen-te-**  
**tal** *adj.*  
**house** (pēnt'hous') *n.* A dwelling, esp. an apartment,  
on the roof of a building.  
**up** (pēnt'ūp') *adj.* Not given expression; repressed  
not up grief.  
**ul-ti-mate** (pī-nūl'tō-mīt) *adj.* Next to last. —**pe-nul'ti-**  
**ē** *n.*  
**um-bra** (pī-nūm'brā) *n.*, *pl.* **-brae** (-brē) or **-brae**. A par-  
shadow, as in an eclipse, between regions of complete shad-  
ow and complete illumination.  
**u-ri-ous** (pī-nōr'ē-əs, -nyōr'ē-) *adj.* 1. Stingy; miserly. 2.  
characterized by penury; extremely poor.  
**u-ry** (pēn'yō-rē) *n.* Extreme poverty.  
**n** (pē'ōn) *n.* 1. An unskilled agricultural laborer of Latin  
America. 2. A person held in servitude to a creditor until an  
indebtedness is satisfied. —**pe-on-age** *n.*  
**ny** (pē'ā-nē) *n.*, *pl.* **-nies**. A plant of the genus *Paeonia*,  
valued for its large, fragrant pink, red, or white flowers.  
**ple** (pē'pāl) *n.*, *pl.* **people**. 1. Human beings <People  
led at him.> 2. a. The body of persons living under 1  
government in the same country; nationality <the French  
ple> b. Enfranchised citizens; electorate. 3. *pl. peoples*. A  
group of persons, often related, who share a common culture,  
age, or inherited condition of life. 4. The mass of ordinary  
persons; populace <the people asserting their rights> 5. Per-  
son who constitute a group united by a common interest <sci-

entific people> —*v.* **-pled**, **-pling**. To fill or furnish with  
people; populate.  
**pep** (pēp) *informal*. —*n.* Energy; vigor. —*v.* **pepped**, **pep-ping**.  
To imbue with pep; invigorate. —**pep-py** *adj.*  
**pepper** (pēp'ər) *n.* 1. a. A tropical Asian vine, *Piper nigrum*,  
bearing small berrylike fruit. b. The dried fruit of the pepper  
used to make a pungent condiment. 2. A bushy plant, *Cap-sicum*  
*frutescens* or *C. annuum*, related to the pepper and cultivated  
for its mild or pungent fruit, used as a vegetable or condiment.  
—*v.* 1. To season or sprinkle with pepper. 2. To sprinkle liberally  
<dark hair peppered with silver> 3. To pelt with or as if with  
small missiles.  
**pepper-corn** (pēp'ər-kōrn') *n.* A dried berry of the pepper  
vine, *Piper nigrum*.  
**pep-per-mint** (pēp'ər-mīnt') *n.* 1. A plant, *Mentha piperita*,  
having downy leaves that yield a pungent aromatic oil. 2. A  
candy flavored with peppermint oil.  
**pepp-ery** (pēp'ə-rē) *adj.* 1. Of, resembling, or containing pep-  
per; hot and pungent. 2. Hot-tempered. 3. Fiery; scathing <a  
peppery temper>  
**pep-sin** (pēp'sin) *n.* 1. An enzyme produced in the stomach  
that acts as a catalyst in the digestion of proteins. 2. A digestive  
aid that contains pepsin.  
**pep-tic** (pēp'tik) *adj.* 1. Pertaining to or aiding digestion. 2.  
Caused by or pertaining to the action of digestive secretions.  
**pe-quite** (pā-kēst') *n.* Can. A member or supporter of the  
Parti Québécois.  
**per** (pūr) *prep.* 1. By the agency of. 2. For, to, or by each. 3.  
According to.  
**per-ad-venture** (pūr'əd-vēn'chər) *adv.* Archaic. Perhaps;  
perchance. —*n.* Chance or uncertainty; doubt.  
**per-amb-u-late** (pər'ām'bū-lāt') *v.* **-lat-ed**, **-lat-ing**. To  
walk around; stroll. —**per-amb-u-lat-ion** *n.*  
**per-amb-u-lator** (pər'ām'bū-lā-tōr) *n.* esp. Brit. A baby car-  
riage.  
**per-an-num** (pər'ān'əm) *adv.* By, for, or in each year; annual-  
ly.  
**per-cale** (pər-kāl') *n.* A fine, closely woven cotton fabric.  
**per-cap-i-ta** (pər'kāp'i-tā) *adv.* & *adj.* Of, by, or for each  
individual.  
**per-ceive** (pər-sēv') *v.* **-ceived**, **-ceiv-ing**. 1. To become  
aware of directly by the senses, esp. to see or hear. 2. To achieve  
understanding or awareness of. —**per-ceive-able** *adj.* —**per-**  
**ceive-ably** *adv.*  
**per-cent** also **per-cent** (pər-sēnt') *adv.* Out of each hun-  
dred; per hundred. —*n.* 1. One part in a hundred. 2. A percent-  
age.  
**per-cent-age** (pər-sēnt'ij) *n.* 1. A fraction or ratio with 100 as  
its denominator. 2. A share or proportion in relation to a whole  
part. 3. Probability; odds. 4. Informal. Profit; advantage.  
**per-cent-ile** (pər-sēnt'il) *n.* A number that divides the range  
of a set of data so that a given percentage lies below it.  
**per-cept** (pūr'sēpt') *n.* A mental impression of something per-  
ceived by the senses together with comprehension of what it is.  
**per-cept-i-ble** (pər-sēpt'ə-bəl) *adj.* Capable of being per-  
ceived. —**per-cept-i-bil-i-ty** *n.* —**per-cept-i-bly** *adv.*  
**per-cep-tion** (pər-sēpt'shən) *n.* 1. The act, process, or result of  
perceiving. 2. The ability to perceive; understanding or insight.  
**per-cep-tive** (pər-sēpt'iv) *adj.* 1. Of or relating to perception.  
2. a. Having perception. b. Marked by perception; discerning.  
—**per-cep-tive-ly** *adv.*  
**per-cep-tual** (pər-sēpt'chū-əl) *adj.* Of, relating to, involving,  
or based on perception. —**per-cep-tual-ly** *adv.*  
**perch** (pūrch) *n.* 1. Something, as a rod, that serves as a roost  
for a bird. 2. A place where one can sit or rest; seat. —*v.* To  
alight or rest on or as if on a perch.  
**perch** (pūrch) *n.*, *pl.* **perch** or **perches**. 1. Either of 2 fresh-  
water food fishes, *Perca flavescens* or *P. fluviatilis*. 2. Any of  
various fishes related or similar to the perch.  
**per-chance** (pər-chāns') *adv.* Maybe; perhaps.  
**per-cep-i-ent** (pər-sēp'ē-ənt) *adj.* Capable of perceiving, esp.  
perceiving readily and keenly. —**per-cep-i-ence** *n.*  
**per-co-late** (pūr'kō-lāt') *v.* **-lat-ed**, **-lat-ing**. 1. To filter or  
trickle through a porous substance. 2. To force boiling water  
through (ground coffee) in order to draw out the essence.  
—**per-co-la-tion** *n.* —**per-co-la-tor** *n.*  
**per-con-tra** (pər'kōn'trā) *adv.* 1. To the contrary. 2. By way of  
contrast.  
**per-cus-sion** (pər-kūsh'ən) *n.* 1. a. The hitting together of 2  
bodies, esp. when noise is created. b. A vibration or impact  
caused by percussion. 2. Detonation of a cap in a firearm. 3. a. A  
musical instrument sounded by striking, as a drum. b. Percus-  
sion instruments as a group. —**per-cus-sion-ist** *n.*  
**per-di-em** (pər'dē-əm) *adv.* For or by the day. —*n.* A daily fee  
or allowance.

**per-di-tion** (pər-dish'ən) *n.* 1. Everlasting damnation. 2. Hell.  
**per-du-ra-ble** (pər-dōr'ə-bəl, -dyōr'ə-) *adj.* Extremely dura-  
ble. —**per-du-ra-bil-i-ty** *n.* —**per-du-ra-bly** *adv.*  
**per-e-grinate** (pēr'ə-grō-nāt') *v.* **-nat-ed**, **-nat-ing**. To trav-  
el around from place to place. —**per-e-grina-tion** *n.*  
**per-e-grine falcon** (pēr'ē-grīn, -grēn') *n.* A widely distribut-  
ed bird of prey, *Falco peregrinus*, once much used in falconry.  
**per-emp-to-ry** (pər'ēmp'tō-rē) *adj.* 1. Terminating all debate  
or action <a peremptory decree> 2. Admitting no refusal or  
contradiction; imperative. 3. Expressing or of the nature of a  
command. 4. Self-assured, sometimes excessively so; self-confi-  
dent. —**per-emp-to-ry-ly** *adv.*  
**per-en-ni-al** (pər-rēn'ē-əl) *adj.* 1. Lasting from year to year. 2.  
Lasting indefinitely; perpetual. 3. Recurring again and again.  
—*n.* A plant that lives for several or many years. —**per-en-ni-**  
**al-ly** *adv.*  
**per-fect** (pūr'fikt) *adj.* 1. Lacking in no essential; complete. 2.  
Being without defect or fault; flawless. 3. Exact; accurate. 4.  
Absolute; utter <a perfect fool> 5. Of, relating to, or consti-  
tuting a verb form that expresses action completed before a  
fixed point of reference in time. *syns*: CONSUMMATE, FAULT-  
LESS, FLAWLESS, IMPECCABLE —*n.* 1. The perfect tense. 2. A verb or  
verb form in the perfect tense. —*v.* (pər-fēkt') To make perfect.  
—**per-fect-ly** *adv.* —**per-fect-ness** *n.*  
**per-fect-i-ble** (pər-fēkt'ə-bəl) *adj.* Capable of making progress  
toward or achieving perfection. —**per-fect-i-bil-i-ty** *n.*  
**per-fec-tion** (pər-fēk'shən) *n.* 1. The state or quality of being  
perfect. 2. The process or act of perfecting. 3. A perfect example  
of excellence.  
**per-fec-tion-ism** (pər-fēk'shō-niz'm) *n.* A tendency to be  
dissatisfied with anything less than perfection. —**per-**  
**fec-tion-ist** *n.*  
**per-fec-to** (pər-fēk'tō) *n.*, *pl.* **-tos**. A cigar that is thick in the  
center and tapers at each end.  
**per-fi-dy** (pūr'fi-dē) *n.* Breach of loyalty or faith; treachery.  
—**per-fi-dious** (pər'fid'ē-əs) *adj.* —**per-fi-dious-ly** *adv.*  
**per-for-ate** (pūr'fō-rāt') *v.* **-rat-ed**, **-rat-ing**. 1. To bore or  
punch a hole in; pierce. 2. To make rows of holes in for easy  
separation. —**per-for-a-tion** *n.*  
**per-force** (pər'fōrs', -fōrs') *adv.* By force of necessity.  
**per-form** (pər'fōrm') *v.* 1. To begin and carry out; accom-  
plish. 2. To fulfill. 3. To function in a certain way; act. 4. To  
give a performance (of). —**per-form-er** *n.*  
**per-form-ance** (pər'fōrm'əns) *n.* 1. The act, process, or man-  
ner of performing. 2. A presentation, as of a musical work,  
before the public. 3. An accomplishment; deed.  
**per-fume** (pūr'fyoom', -pər'fyoom') *n.* 1. A fragrant substance,  
esp. a liquid, as one distilled from flowers. 2. A usu. pleasing  
scent; odor. —*v.* (pər'fyoom') **-fumed**, **-fum-ing**. To fill with  
or as if with perfume; scent.  
**per-fum-er-y** (pər'fyoom'ə-rē) *n.*, *pl.* **-ies**. 1. Perfumes in gen-  
eral. 2. An establishment at which perfumes are made or sold.  
**per-func-to-ry** (pər'fūngk'tō-rē) *adj.* Done merely as a mat-  
ter of routine and with little care or interest. —**per-func-tō-**  
**ri-ly** *adv.* —**per-func-tō-ri-ness** *n.*  
**per-go-la** (pūr'gō-lā) *n.* A structure, as an arbor, with a roof of  
trelliswork.  
**per-haps** (pər'hāps') *adv.* Maybe but not surely; possibly.  
**Peri-cles** (pēr'ə-klēz'). 495–429 B.C. Athenian statesman.  
**peri-gee** (pēr'ə-jē) *n.* The point in the orbit of a satellite of  
the earth at which it is closest to the earth.



**per-i-he-li-on** (pēr'ə-hēl'yən) *n.*, *pl.* **-lia** (-yē). The point in  
the orbit of a celestial body, as a planet, at which it is closest to  
the sun.  
**per-il** (pēr'al) *n.* 1. Danger. 2. Something that is a source of  
danger. —**per-il-ous** *adj.* —**per-il-ous-ly** *adv.*  
**per-im-e-ter** (pər'im'i-tōr) *n.* The outer limits or boundary of  
an area.  
**peri-od** (pēr'ē-əd) *n.* 1. a. An interval of time. b. An interval of  
time regarded as a phase in development; stage. 2. An arbitrary



## Dictionary

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# per·cep·tion

/pərˈsepSH(ə)n/

*noun*

**the ability to see, hear, or become aware of something through the senses.**

"the normal limits to human perception"

- **the state of being or process of becoming aware of something through the senses.**  
"the perception of pain"



# Human Machine Interaction

## Research Results of the MMI Program

2009

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Human Machine Interaction, or more commonly Human Computer Interaction, is the study of interaction between people and computers. It is an interdisciplinary field, connecting computer science with many other disciplines such as psychology, sociology and the arts.

The present volume documents the results of the MMI research program on Human Machine Interaction involving 8 projects (selected from a total of 80 proposals) funded by the Hasler Foundation between 2005 and 2008.

These projects were also partially funded by the associated universities and other third parties such as the Swiss National Science Foundation.

This state-of-the-art survey begins with three chapters giving overviews of the domains of multimodal user interfaces, interactive visualization, and mixed reality. These are followed by eight chapters presenting the results of the projects, grouped according to the three aforementioned themes.

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


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Common terms and phrases

6th Sense abstract ACM action algorithm androids application approach architecture  
ARV augmented reality camera cognitive colour communication complex components  
Computer context database defined detection developed devices dialog display domain  
E2E Adaptation elements emotions encoding parameters engine environment evaluation example  
Fig Figure framework fusion gestures glyphs graphical user interface

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objects. It presents example applications and outlines limitations and solutions for their technical implementation.

MR was derived both conceptually and historically from Virtual Reality (VR). VR systems are computer systems in which users are immersed in a virtual, computer-generated world. The very first examples were originally developed in the 1960s [2]. Immersion is generally achieved through visual, auditory, and sometimes tactile displays. All these displays isolate users from their familiar surroundings, giving the illusion that the only objects existing around them are those rendered by the computer. In MR systems, users perceive both the physical environment around them and digital elements presented through, for example, the use of semitransparent displays. Imagine a system that indicates the name and provenance of items around you by displaying virtual labels overlaying the objects, or a system that guides your way by showing virtual arrows, or a system that displays people’s names and affiliations on virtual badges. The information could be displayed in the native language of each user or could be customized to be most relevant to their individual profile; for example, when browsing food products, specific information could be provided according to the user’s allergies.

MR systems are designed to give their users the illusion that digital objects are in the same space as physical ones (Figure 1). For this illusion of coexistence, the digital objects need to be precisely positioned into the real environment and aligned with the real objects in real time [3]. In fact, the precise real-time alignment or registration of virtual and real elements is a definitive characteristic of augmented reality systems [3], and it constitutes a difficult technical challenge for its realization. Augmented reality is often considered to be a branch of MR. According to the definition of Milgram et al. [4], MR is “subclass of VR related technologies that involve merging of real and virtual worlds”. MR includes systems in which the virtual aspects are dominant as well as those in which the physical reality is dominant. Within this range, augmented reality has more physical elements than virtual elements.



**Fig. 1.** The BUILD-IT system, an example of a collaborative tabletop MR application



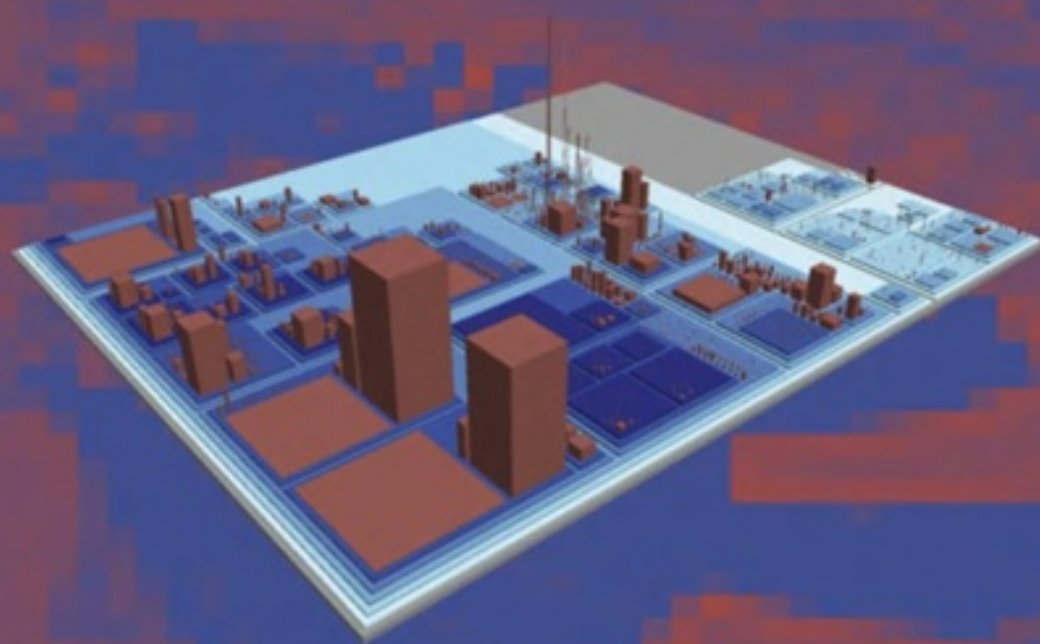
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# Human Machine Interaction

Research Results of the MMI Program



 Springer

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# Human-Computer Interaction Fundamentals

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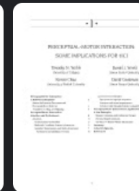
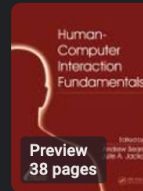
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Editors: Andrew Sears, Julie A. Jacko

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Table of contents

Hailed on first publication as a compendium of foundational principles and cutting-edge research, The Human-Computer Interaction Handbook has become the gold standard reference in this field. Derived from select chapters of this groundbreaking and authoritative resource, Human-Computer Interaction Fundamentals emphasizes emerging topics such as sensor based interactions, tangible interfaces, augmented cognition, cognition under stress, ubiquitous and wearable computing, and privacy and security. It puts the spotlight not only on the fundamental issues involved in the technology of human-computer interactions and but also on the users themselves. The book features visionary perspectives and developments that fundamentally transform the way in which researchers and practitioners view this discipline.

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## Human-computer Interaction Proceedings of HCI International '99 (the 8th International Conference on Human-Computer Interaction), Munich, Germany, August 22-26, 1999



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Hardcover	ebook	Paperback
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#### Common terms and phrases

ACM action activity allow analysis application approach architectures attention auditory behavior cognitive color communication complex Conference consider create determine developed devices direct display Eds effects emotion environment Ergonomics error example experience FIGURE force function goal hand HCI human Human Factors important increases individual influence input interaction interface



More terms and phrases



the reason for this result. Here, the Marine is on his or her side looking up at the bottom of the amphibious tractor. In such places, it is hard to read or write on the clipboard typically used for inspections. The Marine constantly gets into position, crawls out to read instructions, crawls back into position for the inspection, and then crawls out again to record the results. In addition, the Marine tends to do one task at a time when the Marine might have five things to inspect in one place. This extra motion has a major impact on the time required to do a task. By making information truly portable, wearable computers can improve the efficiency of this application and many other similar ones.

The second form of time savings with the VuMan 3 occurred when the inspection is finished. The wearable computer requires a couple of minutes to upload its data to the logistics computer. The manual process, however, required a typist to enter the Marine's handwritten text into the computer. Given that the soldier may have written the notes in cold weather while wearing gloves, the writing may require some interpretation. This manual process represents another 30% of the time.

Such redundant data entry is common when users are mobile (Starner, Snoeck, Wong, & McGuire, 2004). There are numerous checklist-based applications including plant operations, pre-flight checkout of aircraft, inventory, and so forth that may benefit from a form-filling application run on a wearable computer. In the case of the VuMan 3 project, the results were striking. From the time the inspection was started until the data was entered into the logistics computer, 70% of the time was saved by using the wearable. There was a potential savings by reducing maintenance crews from two to one. Finally, there was also a savings in weight over paper manuals.

## THE WEARABLE COMPUTING CAMP

Designing wearable computer interfaces requires attention to many different factors due to their closeness to the body and their use while performing other tasks. For the purposes of discussion, we have created the "CAMP" framework, which consists of the following factors:

- Corporal:** Wearables should be designed to interface physically with the user without discomfort or distraction.
- Attention:** Interfaces should be designed for the user's divided attention between the physical and virtual worlds.
- Manipulation:** When mobile, users lose some of the dexterity assumed by desktop interfaces. Controls should be quick to find and simple to manipulate.
- Perception:** A user's ability to perceive displays, both visual and audio, is also reduced while mobile. Displays should be simple, distinct, and quick to navigate.

Power, heat, on-body, and off-body networking, privacy, and many other factors also affect on-body computing (Starner, 2001). Many of these topics are the subjects of current research, and much work will be required to examine how these factors interrelate. Due to space, we will concentrate mainly on CAMP principles and practice in the remainder of this chapter.

## CORPORAL: DESIGN GUIDES FOR WEARABILITY

The term *wearable* implies the use of the human body as a support environment for the object described. Society has historically evolved its tools and products into more portable, mobile, and wearable form factors. Clocks, radios, and telephones are examples of this trend. Computers are undergoing a similar evolution. Simply shrinking computing tools from the desktop paradigm to a more portable scale does not take advantage of a whole new context of use. While it is possible to miniaturize keyboards, human evolution has not kept pace by shrinking our fingers. There is no Moore's Law for humans. The human anatomy introduces minimal and maximal dimensions that define the shape of wearable objects, and the mobile context also defines dynamic interactions. Conventional methods of interaction, including keyboard, mouse, joystick, and monitor, have mostly assumed a fixed physical relationship between user and device. With wearable computers, the user's physical context may be constantly changing. Symbol's development of a wearable computer for shipping hubs provides an example of how computing must be adapted for the human body.

As a company, Symbol is well known for its barcode technology; however, it is also one of the first successful wearable computer companies, having sold over 100,000 units from its WSS 1000 line of wearable computers (see Fig. 15.2). The WS-1000 consists of a wrist-mounted wearable computer that features a laser barcode scanner encapsulated in a ring worn on the user's finger. This configuration allows the user to scan barcodes while keeping both hands free to manipulate the item being scanned. Because the user no longer has to fumble with a desk-tethered scanner, these devices increase the speed at which the user can manipulate packages and decrease the overall strain on the user's body. Such features are important in shipping hubs, where millions of packages are scanned by hand every year. Symbol spent over U.S. \$5 million and devoted 40,000 hours of



FIGURE 15.2. Symbol's WSS 1000 series wrist-mounted wearable computer with ring scanner.



# Human- Computer Interaction

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## Fundamentals

Edited by

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Andrew Sears  
Julie A. Jacko



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c1330-

perceive, v.

transitive. To apprehend with the mind; to become aware or conscious of; to realize; to discern, observe. Also (occasionally) intransitive.

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## perceive verb

per·ceive (pər-'sēv «)

perceived; perceiving; perceives

Synonyms of *perceive* >

transitive verb

1 a : to attain awareness or understanding of

b : to regard as being such

| was *perceived* as a loser

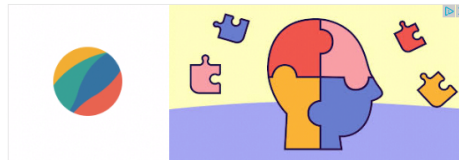
2 : to become aware of through the senses

especially : **SEE, OBSERVE**

perceivable (pər-'sē-və-bəl «) adjective

perceivably (pər-'sē-və-blē «) adverb

perceiver noun



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## Synonyms

feel

scent

see

sense

smell

taste

[See all Synonyms & Antonyms in Thesaurus >](#)Examples of *perceive* in a Sentence

We *perceive* by means of the kaleidoscopic mirror of this life. This means that our ability to perceive is at once tyrannized by our expectations, and at war with them.

—James Baldwin, *The Evidence of Things Not Seen*, 1985

Standing in the hallway just out of sight during this interview was Sarah. She held her baby on her hip and she listened. She *perceived* as no one in the family could the enormity of the misfortune.

—E. L. Doctorow, *Ragtime*, 1974

... and when they *perceived* her to be little struck with the duet they were so good as to play, they could do no more than make her a generous present of some of their least valued toys, and leave her to herself, while they adjourned to whatever might be the favourite holiday sport of the moment, making artificial flowers or wasting gold paper.

—Jane Austen, *Mansfield Park*, 1814

I thought I *perceived* a problem, but I wasn't sure.

*perceived* that it was going to be a nice day

## Recent Examples on the Web

In a profile earlier this year in *The Guardian*, Banks addressed how people *perceive* or misperceive her based on what's online.

—Marc Hogan, *Pitchfork*, 26 Oct. 2023

This shows up in depression symptoms (napping for hours, doom-scrolling at night, avoiding his friends) and anger (losing his temper with our son, snapping at me and *perceiving* very innocent comments as criticism).

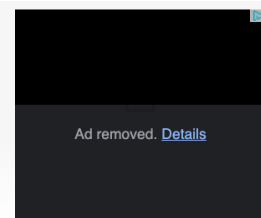


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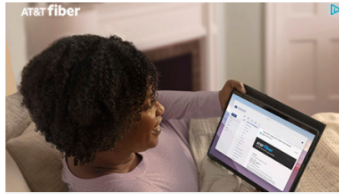


But there are only so many ways to reconstruct or *perceive* ancient life — and even scientists' best guesses can never completely fill the gap.

— Yasemin Saplakoglu, *Quanta Magazine*, 23 Oct. 2023

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### Word History

#### Etymology

Middle English, from Anglo-French *perceivre*, from Latin *percipere*, from *per-* 'thoroughly' + *capere* 'to take' — more at [HEAVE](#) entry 1

#### First Known Use

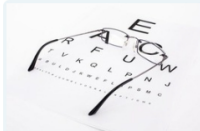
14th century, in the meaning defined at [sense 1a](#)

#### Time Traveler

The first known use of *perceive* was in the 14th century

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Seeming is sometimes believing



#### How Perceptive of You: Words About...

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#### Kids Definition

## perceive verb

per-ceive ([per-'sēv](#))

**perceived; perceiving**

- 1 : [UNDERSTAND sense 1a](#), [COMPREHEND](#)
- 2 : to become aware of through the senses and especially through sight

**perceiver** noun



#### Medical Definition

## perceive transitive verb

per-ceive ([per-'sēv](#))

**perceived; perceiving**

: to become aware of through the senses

**perceivable** ([-sē-ve-bəl](#)) adjective

**perceivably** ([-blē](#)) adverb

**perceiver** noun

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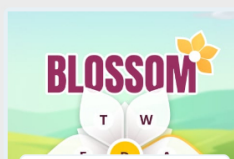
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**perceive** [ per-seev ] [SHOW IPA](#)    
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- verb (used with object), **per-ceived**, **per-ceive-ing**.
1. to become aware of, know, or identify by means of the senses:  
*I perceived an object looming through the mist.*
  2. to recognize, discern, envision, or understand:  
*I perceive a note of sarcasm in your voice.*  
*This is a nice idea but I perceive difficulties in putting it into practice.*

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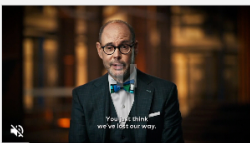
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ORIGIN OF PERCEIVE<sup>1</sup>

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First recorded in 1250-1300 Middle English *perceiven*, from unstressed Anglo-French *perceivre*, for *perçoivre*, from Latin *percipere* “to lay hold of, grasp,” equivalent to *per-* “thoroughly” + *capere*, combining form of *capere* “to take”

SYNONYM STUDY FOR PERCEIVE

1. See [notice](#).

OTHER WORDS FOR PERCEIVE

1 [note](#), [discover](#), [observe](#), [descry](#), [distinguish](#)  
See synonyms for *perceive* on [Thesaurus.com](#)

OTHER WORDS FROM PERCEIVE

**per-ceive-er**, noun  
**per-ceive-ing-ness**, noun  
**non-per-ceive-ing**, adjective  
**re-per-ceive**, verb (used with object), **re-per-ceived**, **re-per-ceive-ing**.  
**self-per-ceive-ing**, adjective  
**un-per-ceive-ing**, adjective

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WORDS RELATED TO PERCEIVE

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HOW TO USE PERCEIVE IN A SENTENCE

“There’s been a real decline in how people *perceive* the effectiveness of the workplace to support the work they do every day,” says Hoskins.

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While Johnson wouldn’t classify their work as political *per se*, they understand how the personal can be perceived as political.

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BRITISH DICTIONARY DEFINITIONS FOR PERCEIVE

**perceive** / (pəˈsiːv) /

*verb*

1. to become aware of (something) through the senses, esp the sight; recognize or observe
2. (*tr*; *may take a clause as object*) to come to comprehend; grasp

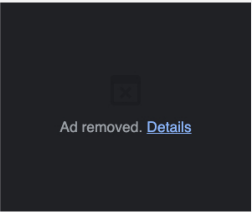
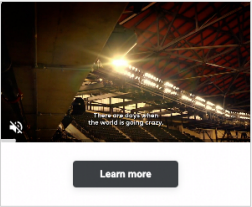
ORIGIN OF PERCEIVE<sup>1</sup>

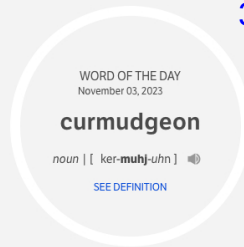
C13: from Old French *perçoivre*, from Latin *percipere* seize entirely, from *per-* (thoroughly) + *capere* to grasp

DERIVED FORMS OF PERCEIVE

**perceivable**, adjective  
**perceivability**, noun  
**perceivably**, adverb  
**perceiver**, noun

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